Appendix 4: Description of the plant communities occurring in the palustrine wetlands in Lesotho

1. *Limosella grandiflora–Haplocarpha nervosa* community

Limosella grandiflora–Haplocarpha nervosa community is a dense, short (2–10 cm) forb-dominated grassland (Figure 5A). It is dominated by *Haplocarpha nervosa* and *Limosella grandiflora*. *H. nervosa* is also the indicator of this community and usually becomes dominant among other forbs and grasses. The community occurs mostly at high altitude (> 2400 m a.s.l.) in seepage or valleybottom habitats, often on peaty or clay permanently wet soils that are deep (≥ 50 cm). The community is moderately high in species diversity.

2. *Trifolium burchellianum* community

This is an open to dense, short (2–15 cm) forb-dominated grassland, which is dominated by *Trifolium burchellianum, Cotula paludosa, Lobelia galpinii* and *Alepidea pusilla. Isolepis angelica* is an indicator of this community. This community mostly occurs at high altitudes (> 2400 m a.s.l.) on shallow to deep (≥ 20 cm) seasonally to permanently wet peaty or clay loam soils, mostly in seepage or valleybottom wetlands. The dominant species (*Trifolium burchellianum*) is usually mat-forming and low creeping but becomes dominant among other forbs and grasses.

3. *Cotula paludosa–Ranunculus meyeri* community

Cotula paludosa–Ranunculus meyeri community is a dense, short to medium tall (2–40 cm) forb-dominated grassland. It is dominated by *Ranunculus meyeri* and *Cotula paludosa* but characterised by *Festuca caprina. Ranunculus meyeri* and *Cotula paludosa* are usually mat-forming and low creeping but becomes dominant among grasses and other forbs. The community is mostly found at high altitudes (> 2400 m a.s.l.) but can also occur in mid-altitude areas. It is mostly associated with shallow to deep (≥ 20 cm) peaty or clay loam soils in seasonally to permanently wet zones of seepages.

4. *Agrostis bergiana* community

Agrostis bergiana community is a highly diverse community whose dominants include *Agrostis bergiana, Trifolium burchellianum, Helichrysum subglomeratum* and *Alchemilla colura. Catalepis gracilis, Cotula hispida, H. subglomeratum, Poa binata* and *Agrostis bergiana* are some of the indicators of the community. It is a dense and short (2–20 cm) grassland, dominated by graminoids. This community is restricted to high altitudes (> 2400 m a.s.l.) mostly in seepages or depressions on shallow to deep (≥ 40 cm) peaty or clay loam soils. It occurs on a range of wetness degree.

5. Mixed short high-altitude grassy community

Mixed short high-altitude grassy community is an open to dense, short to medium tall (2–80 cm) sedgeland or grassland, dominated by forbs or graminoids (Figure 5B). It is a heterogeneous and diverse community with a wide altitudinal range (1400 to above 3000 m a.s.l.) which occurs on shallow to deep (≥ 10 cm) soils of varying texture but can also be associated with peat. The community occurs on a range of wetness degree in seepage or valleybottom wetlands. The communities may also contain *Merxmuellera drakensbergensis, M. macowanii, Mentha longifolia*.

6. *Potamogeton thunbergii* community

Potamogeton thunbergii community is a short to medium tall (30–80 cm) community that usually has low diversity. It is dominated and characterised by *Potamogeton thunbergii*. The community mostly occurs at mid-altitudes (1400–1800 m a.s.l.) but can also be found at high altitudes. It is mainly associated with shallow (20–40 cm) permanently inundated clay or clay loam soils in depressions or valleybottom wetlands. This is hydrophytic vegetation and *P. thunbergii* is a typical aquatic plant whose leaves float on the surface of the water (Figure 5C).

7. *Merxmuellera macowanii* community

Merxmuellera macowanii community is usually a dense, medium tall (40–80 cm) tussock grassland that is usually low in species diversity (Figure 5D). It is dominated by this highly unpalatable grass and its indicator species include *Oxalis obliquifolia and Senecio macrocephalus*. The community can be monospecific and is usually quite distinct within its surroundings. This community occurs in high altitudes (> 2500 m a.s.l.) where

is associated with shallow to deep (≥ 20 cm) peaty or clay soils, mostly in temporarily or seasonally wet zones of seepage or valleybottom wetlands. The community is found throughout the Maloti-Drakensberg.

8. *Gunnera perpensa* community

Gunnera perpensa community is dominated by a conspicuous forb (river pumpkin), *Gunnera perpensa* (Figure 5E). It is also characterised by *G. perpensa* itself and species such as *Cineraria dieterlenii, Nidorella undulata, Peucedanum thodei* and *Scirpus ficinioides.* It is a dense, medium tall (30–60 cm) conspicuous forb-dominated community. This community is diverse and mostly associated with high altitudes (> 2200 m a.s.l.) but can also occur at lower altitudes. The habitat is shallow to deep (≥ 20 cm) peaty, loam or clay soils that are slightly acidic and high in electrical conductivity, mostly in seasonally to permanently wet zones of seepage or valleybottom wetlands. The community may also be associated with *M. longifolia.* This community has been described as variant 3.2.4 of the *Helictotrichon longifolium–Pennisetum sphacelatum* sub-community of the *Fingerhuthia sesleriiformis–Andropogon appendiculatus* community of Brand et al. (2013).

9. *Typha domingensis–Phragmites australis* community

Typha domingensis–Phragmites australis community is a dense, tall (150–300 cm) reedland, usually with low species richness and low evenness. It is usually dominated by *Phragmites australis* and *Typha domingensis* (Figure 5F), which are also indicators of the community. This is mainly a mid-altitude community (1400–1800 m a.s.l.) and many bird species nest in this habitat. This community is found in valleybottom wetlands on shallow to deep (≥ 10 cm), seasonally or permanently wet peaty or clay soils, usually rich in nutrients and high in electrical conductivity. *T. domingensis* and *P. australis* are very competitive and benefit from high nutrient levels (Sieben et al., 2017). Vegetatively, *T. domingensis* resembles *T. capensis.*

10. *Kniphofia caulescens* community

Kniphofia caulescens community is dominated and characterised by this *Kniphofia caulescens,* which also makes the community beautiful, attractive and distinct (Figure 5G). It is a dense, medium tall (30–50 cm) conspicuous grassland which is usually low in species diversity. It is restricted to high altitudes (> 2500 m a.s.l.). The community occurs mostly on seasonally to permanently wet seepage or valleybottom wetland habitats, in deep (≥ 50 cm) peaty or loam soils. It is restricted and endemic to the Maloti-Drakensberg and is quite common in Lesotho.

11. *Isolepis costata* community

Isolepis costata community is a dense, medium tall (30–60 cm) sedgeland, dominated by *Isolepis costata*, which is also the indicator of the community, together with *Juncus oxycarpus* and *Pentzia cooperi*. The community mostly occurs at high altitudes (> 1700 m a.s.l.) in seasonally to permanently wet zones of seepage or valleybottom wetlands, on shallow to deep (≥ 30 cm) peaty or clay soils. It may also be associated with *G. perpensa* and *K. caulescens*.

12. *Eragrostis plana–Pennisetum sphacelatum* community

The *Eragrostis plana–Pennisetum sphacelatum* community is an open to dense, short to medium tall (5–60 cm) grassland, dominated by graminiods that include *Eragrostis plana, Pennisetum sphacelatum, Paspalum dilatatum* and *Eleocharis dregeana.* It has no specific indicator and has moderately high species diversity. The community is found at mid to high altitudes (1400–2600 m a.s.l.), mostly in seepage or valleybottom wetlands. The habitat is on shallow to deep (≥ 15 cm) temporarily or seasonally wet clay or clay loam soils that are associated with high electrical conductivity. This community may also include *Bulbine narcissifolia, G. perpensa, M. longifolia* and *Mentha aquatica*.

13. *Eleocharis dregeana* community

Eleocharis dregeana is the dominant in the *Eleocharis dregeana* community and *Brachiaria eruciformis, Digitaria eriantha, Fingerhuthia sesleriiformis, Fuirena ecklonii, Panicum maximum* and *Polygonum aviculare* are the indicator species. The community is a dense, medium tall (30–60 cm) sedgeland with relatively high species diversity. It occurs at mid to high altitudes (1600–2600 m a.s.l.), mostly in valleybottom wetlands where it is associated with deep (≥ 80 cm) temporarily or seasonally wet clay or clay loam soils. The community may also contain *M. aquatica.*

14. *Eragrostis planiculmis* community

Eragrostis planiculmis community is a dense, medium tall (50–80 cm) grassland dominated by graminoids *(Eragrostis planiculmis* and *Schoenoplectus decipiens*) and the indicators are *Bromus catharticus* and *Hordeum capense*. It has a moderately high species diversity. The community is found at mid to high altitudes (1400–2600 m a.s.l.), mostly in valleybottom wetlands but can also occur in depressions. Its habitat is shallow to deep (≥ 20 cm) temporarily or seasonally wet clay or clay loam soils. It also occurs on a wide altitudinal range.

15. *Cyperus congestus–Leersia hexandra* community

Cyperus congestus–Leersia hexandra community is dominated and characterised by *Leersia hexandra* and *Cyperus congestus*. It is an open to dense, medium tall (30–60 cm) sedgeland with moderately high species diversity. It is found mostly mid altitudes (1400–2400 m a.s.l.) on shallow to deep (≥ 10 cm) seasonally or permanently wet clay or clay loam soils, mostly in valleybottom wetlands though it can also occur in depressions. *L. hexandria* is a common wetland grass in the Lowlands. This community may contain *M. aquatica.*

16. *Kyllinga pulchella* community

Kyllinga pulchella community is a dense, short (20–40 cm) sedgeland that occurs in small patches. *Kyllinga pulchella* is the main dominant in this community and *Andropogon eucomus, Conyza albida, Potamogeton pusillus and Trifolium africanum* are the indicators. It has a moderately high species diversity. It is mainly found at mid-altitudes (1400–1800 m a.s.l.) in valleybottom wetlands or depressions on shallow to deep (5–60 cm) seasonally or permanently wet sand or clay loam soils. *K. pulchella* is a short attractive sedge. The community can also occur as small patches in wet disturbed areas

17. *Schoenoplectus paludicola* community

Schoenoplectus paludicola community is an open to dense, short (25–50 cm) sedgeland. It is mainly dominated and characterised by *Schoenoplectus paludicola*. It has relatively low species diversity. It occurs mostly at mid-altitudes (1400–1800 m a.s.l.) in valleybottom wetlands on shallow to deep (30–70 cm) clay or clay loam soils that are seasonally or permanently wet.

18. *Cyperus fastigiatus* community

Cyperus fastigiatus is both the dominant and indicator of the *Cyperus fastigiatus* community. The community is an open to dense, medium to tall (60–100 cm) sedgeland with low species diversity. It is found mostly at mid-altitudes (1400–1800 m a.s.l.) in valleybottom wetlands or depressions on deep (≥ 70 cm) seasonally or permanently wet clay or clay loam soils that are slightly acidic or neutral. The community is usually a monoculture and has also been reported in South Africa (Sieben et al., 2017).

19. *Carex cognata* community

Carex cognata community is dominated by *Carex cognata* and characterised by *Agrostis eriantha*. It is a dense, medium tall (30–70 cm) sedgeland with relatively low species diversity and low evenness (Figure 5H). This community is a form of sedgeland that mostly occurs at high altitudes (> 2200 m a.s.l.) in seasonally to permanently wet zones of seepage or valleybottom wetlands. The habitat is shallow to deep (≥ 100 cm) peaty or clay soils that are high in electrical conductivity. *C. cognata* is similar to *Carex acutiformis*. The community has a wide ecological amplitude and may also contain *M. longifolia* and *M. aquatica*.

20. *Carex cognata–Juncus effusus* community

Carex cognata–Juncus effusus community is a dense, medium tall (30–70 cm) sedgeland. In addition to being dominant, *Carex cognata and Juncus effusus* are also indicators of this community, together with *Pennisetum thunbergii*. It has moderately high species diversity. This community is also a form of sedgeland that mainly occurs at high altitudes (> 2400 m a.s.l.) in seepage or valleybottom wetlands, mostly on permanently wet habitats. It occurs on shallow to deep (≥ 50 cm) peaty or clay soils.

21. *Eleocharis limosa* community

The *Eleocharis limosa* community is a dense, medium tall (40–80 cm) sedgeland. *Eleocharis limosa* and *Persicaria amphibia* are the dominant and indicator species, respectively. It is low in species diversity (Figure 5I). This community is mostly found at mid-altitudes (1400–1800 m a.s.l.) in depressions or valleybottom

wetlands. The habitat is deep (≥ 60 cm) seasonally or permanently inundated clay or clay loam soils. This community is similar to *Eleocharis dregeana* community.

22. *Cynodon incompletus* community

Cynodon incompletus community is a dense, short to medium tall (20–70 cm) sedgy grassland with moderately high species diversity. *Cynodon incompletus, Cyperus marginatus, Eleocharis limosa* and *Cyperus rotundus* are the dominants in this community. Indicator species include *C. incompletus and Lepidium schinzii*. The community occurs mostly in mid altitudes (1400–1800 m a.s.l.) in valleybottom wetlands on shallow to deep (≥ 10 cm) seasonally or permanently inundated clay or clay loam soils. The community may also contain *M. longifolia.*

Note: This is Online Appendix 4 of Chatanga, P., Sieben, E.J.J., 2019, 'Ecology of palustrine wetlands in Lesotho: Vegetation classification, description and environmental factors', *Koedoe* 61(1), a1574. https://doi.org/10.4102/koedoe. v61i1.1574